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D E C I S I O N
of 15 June 1999

Case Number: T 0974/97 - 3.4.2

Application Number: 90119902.6

Publication Number: 0423753

IPC: G01N 27/90

Language of the proceedings: EN

Title of invention:

Method and apparatus for displaying defects in tubular members

Patentee:

Tuboscope Vetco International

Opponent:

Forschungszentrum Karlsruhe GmbH, Technik und Umwelt

Headword:

-

Relevant legal provisions:

EPC Art. 52(2), 54, 56, 100(b)

Keyword:

"Invention excluded from patentability (no)"

"Novelty (yes)"

"Inventive step (yes)"

Decisions cited:

-

Catchword:

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Boards of Appeal

Chambres de recours

Case Number: T 0974/97 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 15 June 1999

Appellant: Forschungszentrum Karlsruhe GmbH, Technik
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 8 July 1997
rejecting the opposition filed against European
patent No. 0 423 753 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: E. Turrini

Members: M. A. Rayner
B. J. Schachenmann

Summary of Facts and Submissions

I. The present appeal is against the decision of the opposition division rejecting the opposition. The respondent is proprietor of European patent No. 423 753 (application No. 90 119 902.6).

II. The opposition was filed by the appellant (opponent), referring to the following documents in support of the opposition:

E1: Ottes, Stripf, "Korrosion frühzeitig erkennen", in Elektronik 26 vom 23 December 1988

E2: Kernforschungszentrum Karlsruhe, "Ultrascan - das Ultraschall-Molchsystems zur Schadensdetektion in Pipelines", in KfK-Nachrichten, Year 21 1-2/89, pages 37 to 41, special edition pages 1 to 8.

E3: Gunther Krieg, "Ultraschall-Molchsystem zu Korrosionsprüfung von Pipelines", in TÜ Volume 28 (1987), No. 1, Pages 9 to 11

E4: EP-A-271 670

D1: GB-A-2 192 993

D6: EP-A-301 906

III. In the notice of appeal and the reply to the statement of appeal, the appellant and respondent, respectively, requested oral proceedings on an auxiliary basis. The appellant filed the following document with the statement of appeal, indicating that an improved legend

for Figure 8 was provided which was not in E2.

E2': KfK-Nachrichten, Year 21, volume 1-2/89

IV. During the oral proceedings consequent to a summons from the appeal board, the respondent presented as main request amended independent method claim 1 and apparatus claim 28 with the following wording:

"1. A method of detecting and mapping defects in a tubular member (22) comprising:

scanning said tubular member by detecting means monitoring a plurality of discrete segments extending over the entire length of said tubular member (22) to generate a signal (24) which may include signal portions representing a defect in at least one discrete segment of said tubular member (22),

generating a longitudinal signal (28) indicating the longitudinal position of said at least one discrete segment of said tubular member (22);

generating a circumferential signal (26a, 26b) indicating the circumferential position of said at least one discrete segment of said tubular member (22);

correlating said defect (24), longitudinal (28), and circumferential signals (24, 28, 26a, 26b) to obtain defect data, said defect data including the longitudinal position and circumferential position of said defect in said at least one discrete segment of said tubular member (22),

characterised by

processing said defect data in order to classify said defects into different types in dependence on the shape, length and angular orientation thereof, and supplying said processed defect data to a display means

(20) for selectively displaying the presence and the position of a selected one of said different types of defects on a two-dimensional map (44), said map including:

 a first axis (46) corresponding to the length of said tubular member (22),

 a second axis (48) corresponding to the circumference of said tubular member (22),

wherein defects of said selected defect type are displayed as identification images emphasizing said selected defect type at the expense of other defect types.

28. An apparatus for detecting and mapping defects in a tubular member (22) comprising:

 scanning means arranged to scan said tubular member by detecting means monitoring a plurality of discrete segments extending over the entire length of said tubular member,

 means (12) arranged to generate signals (24) which may include signal portions representing a defect in at least one discrete segment of said tubular member (22),

 means (16) arranged to generate a longitudinal signal (28) indicating the longitudinal position of said at least one discrete segment of said tubular member (22),

 means (14) arranged to generate a circumferential signal (26a, 26b) indicating the circumferential position of said at least one discrete segment of said tubular member (22),

 means arranged to correlate said defect, longitudinal, and circumferential signals (24, 28, 26a, 26b) to obtain defect data, said defect data including the longitudinal position and circumferential position

of said defects in said at least one discrete segment of said tubular member (22); characterised by

processing means arranged to process said defect data such as to classify said defects into different types in dependence on the shape, length and angular orientation thereof, and

display means (20) arranged to selectively display the presence and position of a selected one of said different types of defects based on said defect data on a two-dimensional map (44), said map including:

a first axis (46) corresponding to the length of said tubular member (22);

a second axis (48) corresponding to the circumference of said tubular member (22);

wherein defects of said selected defect type are displayed as identification images emphasizing said selected defect type at the expense of other defect types."

V. The arguments of the appellant can be summarised as follows.

An underlying principle of patent law is that patentable subject-matter should include a technical teaching pertaining to how a technical problem should be solved. In the present case no details of any specific technical problem were present in the patent. In fact, in relation to the prior art of E1 to E4 concerning classifying and displaying defects, the only problem possibly addressed in the patent was how to classify and display further defects. The characterising features of claim 1 of the patent do not contain any technical teaching about such other defect

classification and display, but amount to computing subject-matter or in fact merely to what one would like to do without any technical teaching as to how. Furthermore, an operator with a measuring head device could effect measurements and himself present the results thereof. Therefore, neither the requirements of Article 52(2) nor those of Article 100(b) (Article 83 EPC) are satisfied. In addition, sufficient teaching relating to the point of measurement and overlap of discrete segments is not provided. Furthermore, processing as mentioned in the amended claims could only be effected by a computer.

While the subject-matter of the independent claims can be considered novel over the documents E1-E4 because these documents do not specify the type of defects recited in the claims, this subject-matter is obvious when account is taken of document D6 which discloses such defects. Figure 8(a) of E2' shows that a particular defect can be preferentially displayed because the upper part thereof shows only internal corrosion, whereas the lower part shows both external and internal corrosion. Processing the signal on the basis of its return travel times to the inner and outer walls enables this preferential display. Moreover, different colours are used according to the thickness of the pipe wall.

VI. The arguments of the respondent can be summarised as follows.

Different characteristic displays deriving from different defect types can be decisive in dealing with an underlying technical problem with a tubular member,

for example pipe cracks, trapped gas or material hardening. Signal threshold can be adjusted according to defect type. The problem is therefore technical and the solution offered by the patent is also technical because it is electrical signals and processing of data which leads to a display so that the information acquired is not dependent solely on the eye and mind of the observer. On the other hand, both the devices known from E1-E4 and from D6 rely on classification by the observer himself. In the present case, the properties of the display are explained for example, in column 10, lines 39 to 43 and the further processing in column 18 relating to figure 12. Therefore, the patent concerns an invention with a technical character and provides sufficient disclosure for carrying it out. Even an operator with a measuring head cannot rely purely on mental processes since measurement apparatus is needed and moreover a calculated display of measurements would be direct and not include selective preprocessing.

Document E2' provides a direct display of internal and external depth profile without any processing and D6 does not disclose any sorting out of defects at all. Therefore these documents cannot provide a solution to the problem addressed by the patent and accordingly, the subject-matter of the independent claims involves an inventive step.

VII. At the end of the oral proceedings, the appeal board gave its decision.

Reasons for the Decision

1. The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.

2. *Article 123 EPC Amendments*
 - 2.1 The amendments made to the characterising parts of claims 1 and 28 make processing to classify defect data in dependence on shape, length and angular orientation explicitly part of the subject-matter claimed. Supply of said processed defect data to a display means is made explicit in claim 1. Since the effect of these amendments can only be limiting, the board is satisfied that no extension of protection conferred has occurred and thus the requirements of Article 123(3) EPC are met. Since a central processing unit is mentioned for example in lines 16 and 17 of page 6 of the documents as filed, the board is also satisfied that recitation of "processing" in the independent claims is in accordance with the requirements of Article 123(2) EPC.

3. *Article 52(2) - Patentable inventions*
 - 3.1 The board understands the intention of the provisions of Article 52(2) is to permit patenting only in those cases in which the invention involves a contribution to the art in a field not excluded from patentability. Consistent case law of the boards of appeal in relation to these provisions has evolved in the direction that in order to avoid exclusion, an invention must be technical in character (see for example Section I A 1 of the third edition of "Case law of the boards of appeal of the EPO").

 - 3.2 While it is true that the wording of both of

independent claim 1 and of independent claim 28 makes reference to "displaying", it is also true that the technical method and means for such display is provided, for example

- (i) correlating defect, longitudinal, and circumferential signals to obtain defect data,
- (ii) processing said defect data in order to classify said defects into different types in dependence on the shape, length and angular orientation thereof.

Therefore, displaying results not just from a non technical display but from a technical method and apparatus actually processing defect data from signals deriving from scanning the technical structure of a tubular member under investigation and resulting in emphasised display of one defect type. Thus the particular display relies on a particular technical content deriving from real signals and processed data and not just on displaying information in a different way devoid of technical content for example using different alphanumeric characters. Thus, in view of the technical considerations necessarily involved in the claimed subject-matter, the board is satisfied of the presence of a technical content and is thus convinced that the subject-matter of the independent claims is not subject-to exclusion as presentation of information in the sense of Article 52(2)(d) EPC. The technical content of the claimed subject-matter also removes it from being excluded as a computer program or indeed from falling within the other exclusions from patentability mentioned in Article 52(2) EPC. Thus, for example, it is the technical features of the method and

apparatus which emphasise a particular defect, these do not result from a mental act (Article 52(2)(c) EPC) or mathematical method as such (Article 52(2)(a) EPC). This conclusion is not affected by the situation postulated by the appellant of an operator with a measuring head and means such as a pencil and paper for noting position of results and displaying them on paper, because such a situation does not correspond to what is claimed, since for example the postulated situation does not involve features such as those mentioned in 3.2(i) and (ii) above.

4. *Article 100(b) - Sufficiency*

4.1 The subject-matter of the independent claims involves processing of defect signals leading to classification of defect data into the defects recited in the claims, preparatory to emphasized display of a selected defect type. Figures 4a to 4d of the patent in suit show, in the lower region thereof, a graphical representation of the signals received. Column 10, lines 12 to 43 of the description of the patent explain how a threshold value is applied to these signals for display, how short (50a, b and c), long (50d) and angle (50e and f) defects are identified and indicate that additional processing is carried out, explaining moreover what and how defects resulting from the additionally processed signal are displayed in these Figures (for example in the case of Figure 4b, lines 26 to 28 of column 8 recite that the short defects are emphasized with long and angle defects being omitted or shown in a distorted fashion). Figure 12 and the description thereof in column 18 relate to a flow chart and show that algorithms are applied. The board is therefore

convinced that the skilled person has sufficient teaching to see what processing of the defect data is necessary to effect classification and subsequent emphasized selected display.

4.2 Reference is made to "discrete segments" in the independent claims. The second complete paragraph of column 7 of the patent and the sentence bridging columns 5 and 6 explain that at any instant, the signal from a flux detector is indicative of defects in a discrete solid segment of tubular member. In view of the relative longitudinal movement of the tubular member and detectors, the content of the signals from flux detectors relates to the entire length of the tubular member as explained in the last part of the paragraph bridging columns 5 and 6 of the patent. The board therefore has no doubt that sufficient teaching for carrying out the features involving the wording "discrete segments" is provided.

4.3 Accordingly, the board is convinced that a sufficient disclosure in the sense of Article 100(b) is provided by the patent.

5. *Article 54 EPC - Novelty*

5.1 Documents E1 to E4, including E2', all relate to the same device, the "Molchsystem". The board agrees with the common view of the parties that documents E1 to E4 and in particular Figure 8 of E2', in the upper portion thereof, do not show processing defect data such as to classify said defects into different types in dependence on the shape, length and angular orientation thereof. It follows that no one such defect is

selectively displayed at the expense of other defect types. Therefore the subject-matter of the independent claims is novel over the disclosure of documents E1 to E4.

- 5.2 According to document D6, eddy current and ultrasonic data are displayed to the left and right, respectively, of a screen, see for example cathode ray tube 74 in figure 1. Document D6 indicates that correlation of the data presented provides the operator with complementary information concerning the type, shape and characteristics of any defects (the word flaws is used in this sense in document D6) which may exist in the tube wall. However, the operator has himself to evaluate the defect data, it is not processed in order to be classified neither is any defect displayed at the expense of others. Document D1 does not relate specifically to mapping defects in tubular members but to generating a three dimensional defect image pertaining to various manufactured parts. Document D1 employs a scanning mechanism coupled with an eddy current probe to map out directly varying eddy current response over a surface into the three dimensional image. Thus again the operator has himself to evaluate the defect data, it is not processed in order to be classified neither is any defect displayed at the expense of others.

- 5.3 Therefore, the subject-matter of claims 1 and 28 is novel over the disclosures of E1-E4, D1 or D6.

6. *Article 56 EPC - Inventive Step*

- 6.1 The technical problem addressed by the present patent

relates to providing the technical steps and means to determine the extent of defects occurring in a tubular member and visually display them in an improved manner (column 4, lines 5ff). The solution to this problem is significant because defects arising from different causes are of different type. Thus, identification of the cause of the condition of the tubular member is useful in technical design and maintenance. The subject-matter of the independent claims provides the technical wherewithal needed for the solution to the problem posed. This is because the defect data is processed to be classified in dependence on type and one type is selectively displayed.

- 6.2 Starting from the device according to E1-E4 and considering in particular Figure 8a of E2' and the corresponding description, it can be seen that inner and outer corrosion defects can be displayed as explained in the paragraph bridging the centre and right columns on page 38 by virtue of the former being shown in both the upper part thereof deriving from travel time to the inner wall (A in Figure 4) and lower part deriving from travel time to the outer wall (A+D in Figure 4). All defects within the particular travel time range are included in the respective parts of the figure. The wall thickness (and thus seriousness of the corrosion) is denoted by a colour code as mentioned in the last paragraph on page 39. Thus, E1 to E4 teach that the wall thickness (location of corrosion), its seriousness (if it is becoming dangerously thin) and whether it is internal or external can be displayed. However, the display of data is direct without any selection or emphasizing in each figure part and relies on the observer for its interpretation as to whether

corrosion is internal or external or whether dangerous corrosion or safety irrelevant laminations are concerned. The interpretation of the direct display in the upper and lower parts of Figure 8a is possible by the observer because these two parts are shown together. It is only by comparing the two parts that the observer himself can identify the outer corrosion in the lower of the two figures. The inner corrosion is directly displayed in the upper figure. Accordingly, the teaching of documents E1-E4 exhausts itself in providing directly displayed inner and outer corrosion with colour coded magnitude of wall thickness and location. There is thus no obvious reason to jump to emphasized display of one of different types of defect in a tubular member not mentioned in E1 to E4 as the problem solved by the patent is not addressed. There is also no obvious reason to dispense with interpretation by the observer based on juxtaposition of data displays and jump to processing data because there is no requirement for classification of the defects dealt with in the solution according to the patent. The colour coding depends moreover on wall thickness and therefore different colours are not related to different defect type. Accordingly, there is a key gap in the teaching of E1 to E4 in relation to the patent relating to discrimination between defect types without involvement of the observer.

- 6.3 Neither document D6 nor document D1 can fill the gap left in the teaching of E1-E4 because they too rely on the observer for interpreting the data displayed, there being no processing for classification or selective display of different types of defects. Thus while the teaching of document D6 contemplates complementary

display from two different types of sensor being more informative, the teaching inherently relies on these different types and does not suggest that defect data from one sensor type can be processed to provide a selected emphasized display of one defect type without any involvement of the observer. Document D1, while being similar in mentioning different defect types, is less relevant because it does not specifically concern tubular elements.

- 6.4 Supposing nevertheless, that the skilled person decided to draw features from the teachings of documents E1-E4 and D6 because for example they are in similar fields and all rely on the observer interpreting information presented, possible combination of prior art could in the view of the board result in (a) the provision of further sensor types in the Molchsystem of E1-E4 with corresponding further displays like that of Figure 8, or (b) a colour coded magnitude coding of the signals shown in document D6 or the showing of different position according to ultrasonic travel time. Since colour coding is magnitude dependent, it applies to all of the defect information signals provided of whatever "type", so that no classification is entailed thereby. Likewise any signals contained in a travel time window, which essentially defines a position, will all be displayed, whatever their "type". These possibilities would therefore result in a greater mass of unprocessed information and thus in even more interpretation work to be performed by the observer. Such possibilities would accordingly be even further away from plugging the gap and thus even further away from the invention. A result that is not obvious from any combination of documents E1 to E4 with document D6 would be processing

of the defect data to classify defects into types based on shape, length and angular orientation because this would run counter to the common disclosure of concurrent display of differing signals on separate display parts for interpretation by the observer.

- 6.5 Therefore, the prior art documents do not either alone or in combination render the subject-matter of the independent claims obvious so that such subject-matter is considered as involving an inventive step within the meaning of Article 56 EPC

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent in amended form as follows:
 - claims 1 and 28 as presented at the oral proceedings,
 - dependent claims, description and drawings as granted.

The Registrar:

The Chairman:

P. Martorana

E. Turrini